Relationship between the procoagulatory activity and the lung maturity in amniotic fluid

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In addition to the increase in surfactant in amniotic fluid during the course of pregnancy there is also an increase in the procoagulatory activity of the amniotic fluid. This procoagulatory activity increase is derived from a phospholipid-dependent activation of factor X (2,4).

The aim of this study was to determine the course of the development of this activity, its relation to the fetal lung maturity as well as the clinical state of the newborn. As a prerequisite for this study reported methods for the determination of coagulation tests in amniotic fluid were evaluated and,where necessary, modified.- A total of 146 samples of amniotic fluid from the 15th to 43rd weeks of pregnancy were taken by either transabdominal amniocentesis or amniotomy during birth. In addition to the P/S ratio the following coagulation tests were determined after centrifugation: clotting time, modified prothrombin time (Quick), PTT (37°C), PTT (56°C), recalcification time and, in selected samples, thrombelastograms (TEG). All samples contaminated with blood or meconium were discarded.

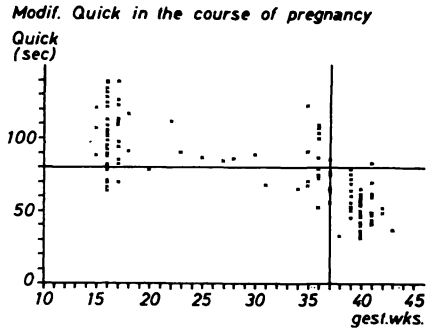

Fig. 1

In the course of pregnancy there is a significant shortening of all coagulation tests measured (Wilcoxon test < 0.001). This was particularly evident in the modified Quick (Fig.1) and the r-time in the TEG (Fig.2). Comparing the values obtained in the 15th to 17th and the 37th to 43rd weeks of gestation and literature results the following values may indicate fetal maturity: clotting time < 100 sec, modified Quick < 80 sec, PTT (37°C) < 30 sec, PTT (56°C) < 29 sec and recalcification time < 80 sec. The lower limit for P/S ratio in normal pregnancy is 5,0 (3)

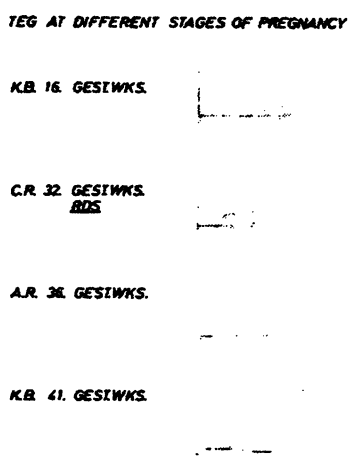

Fig. 2

In 58 cases,amniotic fluid was obtained in the 37th to 43rd weeks of gestation at most 24 hours before delivery. There was no case of RDS in this group. The results of amniotic fluid investigations were correlated with fetal outcome. Eliminating

intermediate P/S values of 4,5 to 5,0 a false negative rate of 1,7% for the prediction of fetal lung maturity was seen. The corresponding rate for the modified Quick was 3,4% and for the clotting time 6,4%.
In the 30th to 36th weeks of gestation 18 children were born within 24 hours of sampling of amniotic fluid, of these, 7 suffered from RDS of various degrees. In these 7 RDS cases all cases could be properly predicted from the recalcification time and the PTT (37°C) (Fig.3). The usual limit of 5,0 for the P/S ratio in normal pregnancy may not always be strictly valid, especially in cases of maternal insulin-dependent diabetes mellitus (1). The false negative rate in this group for all coagulation tests taken together was about 50%; on the other hand, the P/S ratio showed in this group no false negatives.-

RDS - cases 30 - 36 weeks of gestation (n=7)

gestational age	clotting time (100 sec)	modif. Quick (60 sec)	PTT 37°C (30 sec)	PTT 56°C (29 sec)	Recalcif. time (60 sec)	P/S ratio (5,0)
30	<7	88,8	30,8	29,7	123,2	1,5
32	184	117,5	35,5	33,0	121,0	3,4
32	-	121,5	38,1	35,2	137,5	3,7
35	185	122,8	40,3	38,8	125,7	4,5
32*	185	119,2	38,2	32,8	133,5	5,0
36*	115	80,0	31,5	27,8	86,8	5,9
36*	70	73,0	30,5	30,0	81,8	6,1

* insulin - dependent diabetes mellitus

Fig. 3

The present results confirm the increase in the procoagulatory activity in amniotic fluid in the course of pregnancy. The recalcification time and the PTT (37°C) succeeded in predicting the pulmonary status of the newborn in the 7 RDS cases. The fetal lung maturity may be evaluated by means of simple and rapid coagulation tests and this may be useful in the judging of the need for RDS prophylactic therapy. The use of more than one test may enhance the degree of confidence in predicting the pulmonary status. The determination of the L/S or P/S ratios, however, cannot yet be dispensed with. Further investigations are necessary to establish the reliability of coagulation tests in the prediction of fetal lung maturity.

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